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ROAD LOG – STORM-DAMAGED AREAS IN CENTRAL VIRGINIA

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The following road log was prepared in December 1969 to point out and record some effects of damage due to hurricane Camille visible from roadways in selected areas of Nelson, Rockbridge, and Augusta counties. During the night of August 19-20, 1969, torrential rains associated with hurricane Camille fell on these and adjoining counties in Virginia, resulting in extensive property damage and loss of life. In addition to damage caused by the flood waters, landslides of the debris-avalanche type carried soil, boulders, and trees down the steep mountainous slopes. Photographs of some of the effects of the storm damage were published in the October 1969 Special Issue of *Virginia Minerals*; numbers cited in the road log refer to these illustrations.

The user of this log is cautioned that due to reclamation efforts and the masking effect of vegetation many of the features indicated may not be visible, especially with the passage of time. Virginia Department of Highways county road maps and U. S. Geological Survey 7.5-minute series topographic maps are recommended for use with this road log to portray the geography and terrain. The following topographic maps cover this area: Cornwall, Horseshoe Mountain, Lexington, Lovingston, Massies Mill, Montebello, Arrington, and Vesuvius. Photographs used as illustrations were taken by Thomas M. Gathright.

Cumulative Mileage	*Distance*	*Explanation*
0.0	0.0	Begin road log at the intersection of U. S. Highway 29 and State Highway 6 on the northeast side of the Rockfish River. Nearby is the confluence of Muddy Creek and the Rockfish River at Woods Mill. Siltation, channel scour, and deposition of debris have occurred in river and creek valleys. Debris consists of large quantities of sand, silt, and trees with small amounts of rubble intermixed (Nos. 20 and 25). Travel southward on U. S. Highway 29.
0.7	0.7	Cross Davis Creek. The effects of siltation and channel scour are present to the right of the highway along Davis Creek. The bridge here was destroyed. To the left is the confluence of Davis and Muddy creeks.
2.4	1.7	Log debris on the left side of U. S. Highway 29 along Muddy Creek.

Cumulative Mileage	*Distance*	*Explanation*
3.2	0.8	Junction with State Road 623 on the right at Myndus. Note chutes on Woods Mountain (straight ahead along U. S. Highway 29) and on mountain to left (No. 13). Turn right on State Road 623.
3.5	0.3	On the left are chutes (some coalescing) on the ridge slope (No. 17).
3.9	0.4	Junction with State Road 776 on the right at Oak Hill Church; continue on State Road 623.
4.4	0.5	Junction with State Road 785 on the right; continue on State Road 623.
4.8	0.4	Enter flood plain of Davis Creek.
5.1	0.3	Extensive debris deposits are in the stream valley, and numerous chutes are developed on hillslopes on both sides of the road.
5.7	0.6	A debris fan is present in a tributary across Davis Creek. Some sorting is evident in the material that constitutes the fan; cobble, gravel, and sand debris tend to occupy the areas adjacent to channels and these deposits are flanked by boulders. Stacking of the debris in a downstream direction is suggested by the attitude of planar boulders and cobbles. Boulders in these fans have dimensions as large as 15 by 10 by 7 feet. Both well-rounded and angular fragments are present (Figure 1). Boulders in the valley of Davis Creek are as large as 11 by 10 by 7 feet. Stream scouring produced vertical banks up to 12 feet high. Two soil profiles with ancient flood-plain deposits are exposed in the bank (Figure 2; No. 7).

Figure 1. Boulders and gravels disgorged from hillside ravines and deposited along a slope adjacent to Davis Creek. About 3.7 miles southwest of Woods Mill.

Figure 2. Deposition of a boulder cap (left center) on pre-existing alluvial material, a portion of which was subsequently eroded. Gravels were exposed at the base of the incised stream bank (upper right). About 3.7 miles southwest of Woods Mill.

Cumulative Mileage	*Distance*	*Explanation*
6.0	0.3	Junction with State Road 625 to the right; continue on State Road 623. A side trip (about 2 miles) can be taken along State Road 625 which follows the North Prong of Davis Creek. Extensive deposits of debris occur in the valley, and numerous chutes are well exposed on hillslopes near the road (Nos. 8, 11, 16).
6.4	0.4	Coalescing chutes (located near the center of Figure 3) are present to the left of State Road 623.
6.5	0.1	Boulders and log debris on the left along tributary to Davis Creek; house damaged here (Figure 4).
6.8	0.3	Road bed has been relocated here due to flood damage. The road was much closer to the stream prior to the flooding; it has been relocated on higher ground (No. 21 in this vicinity).
8.0	1.2	End of State Road 623 near head of valley of Davis Creek (No. 5). Turn around and return to U. S. Highway 29 via State Road 623.
12.1	4.1	Note numerous chutes in distance to the left and ahead on mountain slopes.
12.8	0.7	Junction of State Road 623 and U. S. Highway 29 at Myndus. Turn right and proceed southward on U. S. Highway 29.

Figure 3. Several chutes developed below ridge crests during debris avalanches (midground and background). Boulders and tree trunks were strewn along Davis Creek. About 4.5 miles southwest of Woods Mill. House in orchard area (see arrow) illustrated in Figure 4.

Cumulative Mileage	*Distance*	*Explanation*
13.2	0.4	Note numerous chutes to the right on mountain slopes.
14.7	1.5	Debris cone present to the right of U. S. Highway 29. Part of the highway was washed out at this locality (Nos. 14 and 19).
15.1	0.4	At this locality, a tributary to Muddy Creek was temporarily ponded, resulting in the deposition of large quantities of silt and mud (not visible from the southbound lane of U. S. Highway 29; see No. 24).
15.2	0.1	Town of Lovingston.
15.3	0.1	Log debris in stream valley to the left (Figure 5).
16.4	1.1	Junction of U. S. Highway 29 and 29 bypass; take bypass. Chutes are developed on mountain slopes to the right and left of the highway.
18.4	2.0	Crossing of Dillard Creek; the road was damaged here. Note extensive silt deposits in valley of creek.
20.0	1.6	U. S. Highway 29 was washed out here at crossing of Rucker Run.
21.6	1.6	Junction with State Highway 158; turn right on State Highway 158.
22.7	1.1	Intersection with State Road 655; turn right on State Road 655.

Cumulative Mileage	*Distance*	*Explanation*
25.5	2.8	Note chutes to the right on mountain slopes.
25.6	0.1	Junction with State Road 672; continue on State Road 655.
26.2	0.6	At the confluence of Hat Creek and the Tye River at Roseland, large quantities of silt and log debris were deposited (Nos. 27 and 28).
26.7	0.5	Junction with State Highway 151; turn right on State Highway 151.
27.5	0.8	Junction with State Road 673; turn right on State Road 673. Note chutes on ridges to the right and ahead.
28.5	1.0	Bridge over Hat Creek was destroyed. Effects of siltation and scouring are visible along creek.
29.3	0.8	Intersection with State Road 672; turn left on State Road 672.
29.4	0.1	Rubble-strewn slopes are visible to the right (No. 3). Landform here is suggestive of an ancient alluvial debris fan. To the north on State Road 672 there are numerous chutes on either side of the road along the valley of the East Branch of Hat Creek. Several topographic features, which have the appearance of ancient debris fan deposits, can be seen on both sides of the road.

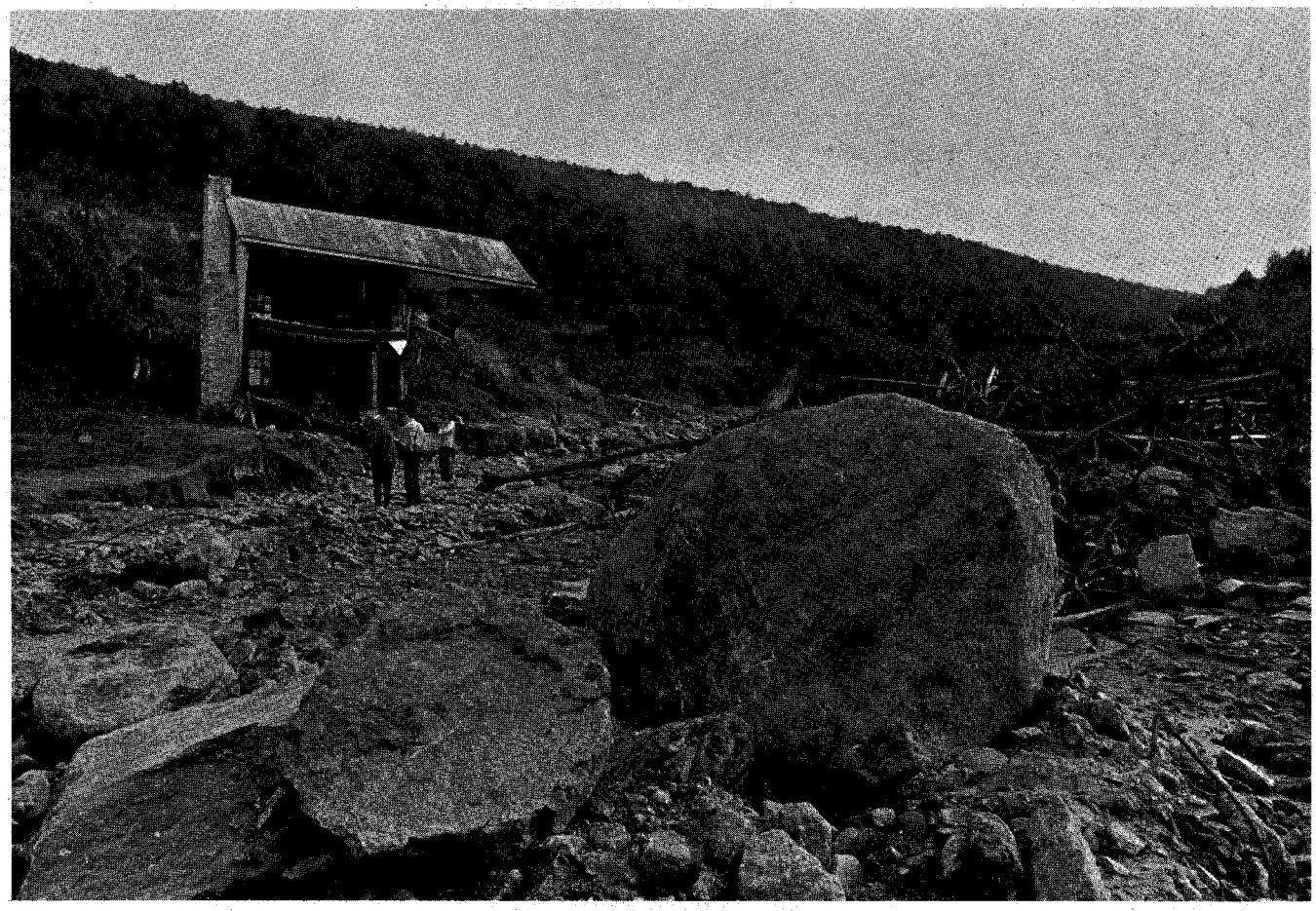

Figure 4. Portion of home destroyed by debris-laden torrent. Large boulder in foreground is approximately 5 feet in diameter; bedrock below unsupported section of roof was exposed by flood water. Along a tributary to Davis Creek about 4.5 miles southwest of Woods Mill.

Figure 5. Mat of jumbled tree trunks in the valley of a small tributary to Muddy Creek. Recession of the water after temporary ponding resulted in settling of debris on a surface of silt and mud. Fence posts were emplaced after flood. Along U. S. Highway 29, Lovingston.

Cumulative Mileage	*Distance*	*Explanation*
29.9	0.5	Damaged orchard and rubble-strewn drainage on the right.
30.7	0.8	To the right, extensive deposits of debris from Ginseng Hollow are present along a tributary to Hat Creek.
30.8	0.1	The road was washed out where it crosses a tributary to Hat Creek.
31.3	0.5	Junction with State Highway 151 at Bryant; turn left on State Highway 151. A side trip can be taken to the northeast along State Highway 151 for about 4.5 miles. There are numerous chutes on the mountainsides and extensive deposits of debris along Hat Creek (Figure 6).
31.5	0.2	To the left, note silt deposits in the valley of Hat Creek and chutes on the mountain.
35.6	4.1	Intersection with State Highway 56; turn right on State Highway 56.
36.9	1.3	Community of Massies Mill.
37.3	0.4	Highway crossing of Tye River. Ahead, in the community of Massies Mill, extensive damage is visible; practically every building was damaged.
40.6	3.3	Community of Tyro; extensive damage occurred here.
41.5	0.9	The road was badly damaged at this locality. Extensive debris is present

Cumulative Mileage	*Distance*	*Explanation*
		along Tye River and the road for approximately 1 mile upstream from this point.
43.6	2.1	Cross Coxs Creek; note jumbled debris in creek valley.
44.0	0.4	Crossing of Tye River; bridge destroyed here.
45.5	1.5	Community of Nash. Junction with State Road 687 at confluence of North and South Forks of Tye River; continue on State Highway 56.
45.9	0.4	Large boulders are present in the bed of the South Fork of Tye River. Most boulders appear to have weathered surfaces without visible effects of abrasion.
47.6	1.7	Crabtree Falls is visible on the mountain slope to the left.
48.2	0.6	To the left is a large deposit of log debris in the bed of the South Fork of Tye River.
49.3	1.1	Cross the South Fork of Tye River. The road was washed out here.
50.8	1.5	Junction with State Road 690 near the crossing of Mill Creek; continue west on State Highway 56. Some gravel debris is visible along Mill Creek.
52.2	1.4	Community of Montebello.
54.2	2.0	Nelson-Rockbridge county boundary. Ahead State Highway 56 passes beneath the Blue Ridge Parkway at Tye River Gap.

Figure 6. Frame structures distorted by force of rampant flood water that caused development of billowy wrinkles in metal roofs. Tree trunks (foreground) were aligned with direction of water flow. Near headwaters of Hat Creek about 2.4 miles northeast of Bryant.

Cumulative Mileage	*Distance*	*Explanation*
56.9	2.7	Crossing of Little Marys Creek; there is gravel debris along the creek.
57.3	0.4	Note small chute developed in Antietam quartzite talus to the right of the highway.
58.0	0.7	Community of Vesuvius. Junction with State Road 608; turn right on joint State Highway 56 and State Road 608.
58.6	0.6	Junction of State Highway 56 and State Road 608; continue to the right on State Road 608. A side trip to view damage along Marl Creek can be taken by continuing westward on State Highway 56 for about 0.8 mile.
58.9	0.3	Rockbridge-Augusta county boundary.
59.4	0.5	Road and bridge washed out.
59.6	0.2	To the left are damaged gravel pits of the South River Gravel Company.
60.5	0.9	To the right, a water gap is visible where St. Marys River has cut through the mountain front.
60.8	0.3	Junction with State Road 667; continue on State Road 608. Note gravel debris along South River to the right.
61.1	0.3	Junction with U. S. Forest Service Road 41; turn right onto U. S. Forest Service Road 41.
61.7	0.6	Junction with U. S. Forest Service Road 42; continue on U. S. Forest Service Road 41.
62.0	0.3	Note gravels from St. Marys River outwash. There has been considerable damage to the road ahead.
62.3	0.3	Enter gorge of St. Marys River.
62.4	0.1	On the left is a small chute developed in Antietam quartzite talus.
62.5	0.1	Note boulder and log accumulations along the river. Debris in trees indicates that flood waters were at least 12 feet above normal stream level. Farther eastward along this road a 4.5-foot-deep channel was cut into the former roadway. Turn around and return to junction with State Road 608.
63.9	1.4	Junction with State Road 608; turn left on State Road 608.
66.4	2.5	Junction of State Road 608 and State Highway 56; continue southward on State Road 608.
67.0	0.6	Community of Vesuvius; continue on State Road 608.
67.2	0.2	Note unsorted boulders to the right. Road and bridge washed out at crossing of Little Marys Creek. There are extensive deposits of boulders and log debris on banks and in fields along South River. Most tributaries also contain debris.
68.5	1.3	Extensive section of road washed out.
68.9	0.4	Cross Norfolk and Western Railway tracks.
69.0	0.1	On the left, note large parabolic scar caused by mudflow; damage continues on down slope to the right across the road and tracks.
69.6	0.6	Junction with U. S. Forest Service Road 104; turn left onto U. S. Forest Service Road 104 along Big Marys Creek.

Cumulative Mileage	*Distance*	*Explanation*
69.9	0.3	Road partially washed out.
70.4	0.5	Crossing of Big Marys Creek. The west approach to the bridge was partially washed out. The road on the east side of the bridge was also washed out and covered with large deposits of rock and log debris. Debris on the bridge indicates that water was at least 15 feet above normal stream level. Turn around and return to State Road 608.
71.2	0.8	Junction of U. S. Forest Service Road 104 and State Road 608; turn left on State Road 608.
72.5	1.3	On the right, bent trees indicate the direction of water flow. Extensive gravel and boulder deposits are present in fields on the right bank of the river. The road was damaged where the river "straightened" its channel.
72.7	0.2	Junction with State Road 709 to the right; continue on State Road 608.
73.0	0.3	One-room church on the right side of the road was moved downstream about 30 feet; the downstream side of the church was more heavily damaged than the upstream side. Two other buildings at this locality were also damaged.
73.4	0.4	Community of Marlbrook; note extensive debris at confluence of South River and Marlbrook Creek; many blocks of travertine and marl are present. There was extensive damage to the road ahead for about 1 mile.
74.8	1.4	Bridge destroyed.
74.9	0.1	Small chute on hillside to the right; head of the chute is about midway down the slope. Road damaged extensively ahead.
75.2	0.3	Note two small chutes on the right (heads of the chutes are about midway down the hillside slope).
76.1	0.9	Community of Midvale to the right. Two buildings were destroyed at the junction of State Road 608 and State Road 714.
77.1	1.0	Note many small slumped areas and two narrow chutes on the hillside to the right. The South River cut a 2-foot-deep channel through fields to the right.
77.9	0.8	Note small chute to the right on hillside (head of the chute is near the top of the slope).
78.6	0.7	Confluence of Irish Creek and South River. Two buildings at the junction of State Roads 608 and 603 were destroyed, and the bridge on State Road 608 was washed out.
79.3	0.7	Intersection with State Road 716; continue on State Road 608. Community of Cornwall; note accumulation of gravels at the confluence of South River and Whites Run. The bridge over South River was destroyed. Just downstream along the river, bent trees indicate current direction.
80.5	1.2	Cypress Falls. The road was extensively damaged in this vicinity.
82.4	1.9	Intersection of State Roads 608 and 631; turn right on State Road 631. There was considerable damage to buildings here.
82.7	0.3	On the right, note damage along Marl Creek.

Cumulative Mileage	*Distance*	*Explanation*
82.9	0.2	Junction with State Road 706 on the right; continue on State Road 631.
83.9	1.0	Panoramic view of Lexington area ahead (to the west).
85.3	1.4	Pass beneath Interstate Highway 81.
86.3	1.0	Confluence of Mill Creek and Maury River. On the left is damage to Chesapeake and Ohio Railway track and bridge. Track was moved about 60 feet and turned 90 degrees from its original position; the bridge was moved and canted. Debris in trees upstream from the bridge is about 20 to 25 feet above the normal level of Mill Creek.
86.6	0.3	On the left, Chesapeake and Ohio Railway switch uprights (1.5 inch diameter hollow metal pipes) were bent 45 degrees from a vertical position by water flow.
87.0	0.4	Intersection of State Road 631 and U. S. Highway 11. Just upstream on Maury River, the Chesapeake and Ohio Railway bridge was destroyed. End of road log.

THE MINERAL INDUSTRY IN VIRGINIA IN 1969[1]

PRELIMINARY DATA

Due principally to a record-breaking output of coal, coupled with a substantially higher unit value for this commodity, the total value of 1969 mineral output in Virginia rose to a new high of $311 million, according to estimates by the Bureau of Mines, United States Department of the Interior. The value was 5 percent greater than the $296 million reported in 1968, the previous record high value year.

The production of bituminous coal, the leading commodity in terms of both tonnage and value, increased for the seventh consecutive year and was 1 percent higher than in 1968, the previous record year. Production of natural gas decreased while petroleum output was unchanged. Mineral fuels were produced in the southwestern part of the State.

Production of stone, next to coal in importance to the mineral economy of Virginia, declined slightly. Crushed stone accounted for virtually all of the output. Dimension stone, which constituted 8 percent of the total stone value, declined substantially in output value, due principally to flood damage (as an aftermath of hurricane Camille) to dimension soapstone production facilities. The value of crushed stone was slightly lower. Sand and gravel declined slightly in output but gained slightly in value. Shipments of portland cement were substantially lower due principally to the closing of a cement plant in Augusta County, reducing the number of active portland cement plants in Virginia from three to two. Shipments of masonry cement increased moderately. Lime gained 19 percent in both output and value, primarily because of increased demand for industrial lime, as consumption by chemical and metallurgical industries continued to grow. Among other nonmetallic minerals gaining in output and value were aplite, clay, gypsum, and kyanite. Those for which declines were reported included feldspar, salt, and crushed soapstone.

Production of lead and zinc decreased 5 percent and 2 percent, respectively; the ratio of zinc output to lead output was about 6 to 1. Values were moderately higher due to higher average unit prices in 1969 for both lead and zinc. Production of titanium concentrate decreased moderately; ilmenite was the only titanium mineral produced, and the output was used primarily in the manufacture of pigments. The production decline was due chiefly to closing of an ilmenite and rutile production facility. The output of iron ore for pigment manufacture was substantially greater.

[1] Prepared by David J. Kusler, U. S. Bureau of Mines, Pittsburgh, Pennsylvania.

Table 1.—Mineral production in Virginia.[1]

Mineral		1968 Quantity	1968 Value (thousands)	Preliminary 1969 Quantity	Preliminary 1969 Value (thousands)
Clays	thousand short tons	1,462	$ 1,714	1,480	$ 1,750
Coal (bituminous)	do	36,966	178,946	[2] 37,400	[3] 196,500
Gem stones		NA	7	NA	7
Lead (recoverable content of ores, etc.)	short tons	3,573	944	3,401	1,009
Lime	thousand short tons	919	11,138	1,090	13,211
Natural gas	million cubic feet	3,389	1,013	3,070	927
Petroleum (crude)	thousand 42-gallon barrels	3	W	3	W
Sand and gravel	thousand short tons	10,859	13,644	10,757	13,736
Soapstone	short tons	3,928	10	3,800	10
Stone	thousand short tons	31,217	53,533	30,603	51,635
Zinc[4] (recoverable content of ores, etc.)	short tons	19,257	5,199	18,859	5,507
Value of items that cannot be disclosed: Aplite, cement (portland and masonry), feldspar, gypsum, iron ore (pigment material), kyanite, salt, titanium concentrate (ilmenite and rutile-1968), and data indicated by symbol W		—	29,515	—	27,091
Total		—	$295,663	—	$311,383

NA Not available. W Withheld to avoid disclosing individual company confidential data.

1 Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2 Based primarily on railroad carloadings.

3 Based on final 1968 Bureau of Mines State figures for value per ton, f.o.b. mine, adjusted to a 1969 level by use of Bureau of Labor Statistics price index. These latter indices were for bituminous coal at the U. S. level for the first 10 months of 1968 and 1969.

4 Recoverable zinc valued at the yearly average price of prime western slab zinc, East St. Louis market. Value established after transportation, smelting, and manufacturing charges have been added to the value of ore at the mine.

GEOLOGY SECTION MEETING

The annual meeting of the Geology Section of the Virginia Academy of Science will be held May 7-8, 1970 at the John Marshall Hotel, Richmond, Virginia. This year a series of papers dealing with the uses of geology in Virginia will be presented. Representatives of State, Federal, academic, and industrial groups are being invited to discuss application of geology to scientific, industrial, and environmental problems they have experienced. Applicable movies are scheduled. The theme of this meeting will be to introduce the various types of employment open to geologists and to present results of research. All people interested in the uses of geology in the Commonwealth are invited to attend.

The first annual Virginia Field Conference sponsored by the Geology Section in the fall of 1969 was attended by over 90 people from Virginia, Maryland, West Virginia, North Carolina, Ohio, and the District of Columbia. Many types of geologic work and interests were represented. The field conference for the fall of 1970 will be hosted by the Geology Department of Washington and Lee University, Lexington, Virginia.

ADDITION TO STAFF

Mr. Donald H. Fulkerson joined the Division staff on September 1, 1969 and will assist in mapping the Shenandoah National Park. He received his B.S. degree in geology from the University of Illinois in 1950 and his M.A. degree from the University of Wyoming in 1951.

Don's geological career began with Carter Oil Company in their exploration department in the States. He has worked as an exploration geologist and manager for several petroleum and mining companies in Egypt, Peru, South West Africa, and Ecuador. In addition to working as a groundwater geologist, his main interest has been in the field of economic geology. He is married and has a daughter.

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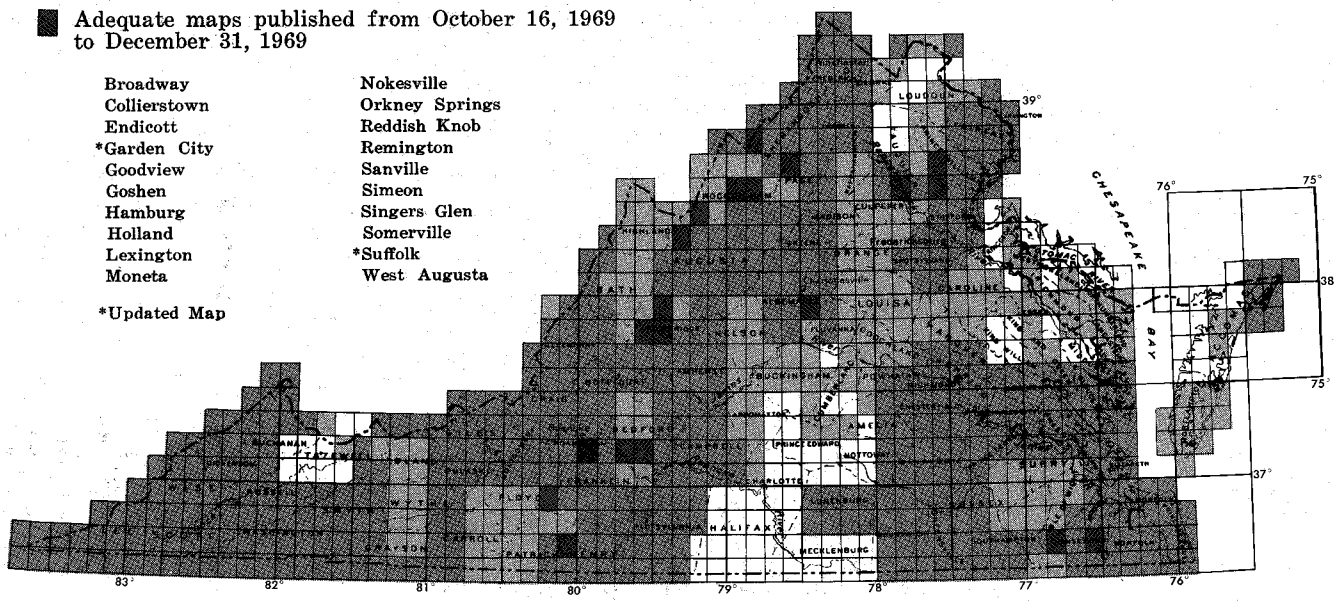
TOPOGRAPHIC MAPS

7.5-MINUTE QUADRANGLE TOPOGRAPHIC MAPS

- Work in progress
- Advance prints and revision compilations
- Adequate maps published prior to October 16, 1969
- Adequate maps published from October 16, 1969 to December 31, 1969

Broadway	Nokesville
Collierstown	Orkney Springs
Endicott	Reddish Knob
*Garden City	Remington
Goodview	Sanville
Goshen	Simeon
Hamburg	Singers Glen
Holland	Somerville
Lexington	*Suffolk
Moneta	West Augusta

*Updated Map



ADVANCE PRINTS AND REVISION COMPILATIONS

Advance prints and copies of revision compilations are available at 50 cents each from the U. S. Geological Survey, Topographic Division, 1109 N. Highland St., Arlington, VA 22210.

PUBLISHED MAPS

State index is available free. Updated maps, on which recent cultural changes are indicated, are now available for certain areas of industrial, residential, or commercial growth. Published maps are available at 50 cents each from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, VA 22903.